

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/713,572
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Applicant: Kazuaki SAKURADA
Group Art Unit: 1792
Examiner: Brian K. Talbot
Title: MANUFACTURING METHOD OF MULTILAYER
CIRCUIT BOARD
Attorney Docket: 9319G-000593

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PRE-APPEAL BRIEF REQUEST FOR REVIEW ARGUMENTS

In conjunction with Applicant's Pre-Appeal Brief Request for Review, Applicants contend that the cited prior art does not anticipate the elements of the presently pending claims, and that the combination or modification of the cited prior art references do not yield the elements of the presently pending claims because the combination or modification of the cited prior art references fail to teach or suggest all the elements of the presently pending claims.

STATUS OF CLAIMS

Claims 1 and 3-8 are pending. Claims 1 and 6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 08-236908 (JP '908) in combination with U.S. Pat. No. 6,503,831 (Speakman) alone or further in combination with U.S. Pat. No. 5,795,794 (Nagano); and claims 3-5, 7 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '908 in combination with Speakman alone or further in combination

with Nagano or still further in combination with JP 10-221698 (JP '698) and JP 11-163499 (JP '499). These rejections are respectfully traversed.

SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 recites a manufacturing method of a multilayer circuit board, comprising the step of forming at least two wiring layers, an inter-layer insulating film provided between every adjacent two of the wiring layers, and conductive posts for providing electrical conductivity between the wiring layers. The inter-layer insulating film is formed by changing the film thickness of the inter-layer insulating film according to a concavo-convex shape of an area where the inter-layer insulating film is formed, so as to level an upper surface of the inter-layer insulating film. Moreover, the inter-layer insulating film is formed by using a droplet jetting method and the formation of the inter-layer insulating film includes at least a first step of forming an inter-layer insulating film whose film thickness is changed so as to completely fill concave portions in the concavo-convex shape with the insulating film through a single ink-jetting operation over the area where the inter-layer insulating film is formed.

ARGUMENT

Claim 1 recites that the inter-layer insulating film is formed by changing the film thickness of the inter-layer insulating film according to a concavo-convex shape of an area where the inter-layer insulating film is formed, so as to level an upper surface of the inter-layer insulating film. Moreover, the inter-layer insulating film is formed by using a droplet jetting method and the formation of the inter-layer insulating film includes at least a first step of forming an inter-layer insulating film whose film thickness is changed so as to completely fill concave portions in the concavo-convex shape with the insulating film through a single ink-jetting operation over the area where the inter-layer insulating film is formed. Accordingly, a substantially completely flat surface can be produced through a single operation over the target area. In addition, the inter-layer insulating film is

efficiently formed without producing any waste. The claimed invention, therefore, has superior efficiency and very distinctive effects in comparison with the prior art.

In contrast, JP '908 teaches depositing a liquid photosensitive resin 3 by means of an electrostatic method on areas where no conductive patterns 2 are formed. As shown in Fig. 1(b) of JP '908, the top face of resin 3 after deposition is not even because V-shaped gaps are formed in sectional view at each boundary between the liquid photosensitive resin 3 and the conductive patterns 2. In order to fill up the gaps, an additional process of depositing the liquid photosensitive resin 3 is provided. See Fig. 1(c). However, when this process is performed using spray coating or the like, the top face should still not uniformly even (even though the drawings show a flat upper surface). Further, neither Nagano et al. nor Speakman discloses formation of an inter-layer insulating film by changing the film thickness thereof according to a concavo-convex shape of an area where the inter-layer insulating film is formed.

Accordingly, the following differences between the claimed invention and JP '908 are evident:

- (i) difference in coating methods: inkjet method versus coating of liquid photosensitive resin by means of spray coating or the like,
- (ii) difference in the number of processing times: single operation by changing the film thickness according to a concavo-convex shape of the target area, versus several-times operation by repeating spray coating or the like, and
- (iii) difference in finished conditions: a completely flat surface obtained by the film-thickness changing control versus a surface which cannot be uniformly flat even by repeating the coating process several times.

At the outset, the Examiner admits that JP '908 fails to teach droplet jetting (see page 2 of the Final Office Action dated June 16, 2008), but alleges that Speakman, Nagano, JP '698, and JP '499 teach using ink jetting to deposit patterns. By modifying

JP '908 with the ink jet teachings of Speakman, Nagano, JP '698, and JP '499, the Examiner further alleges that an inter-layer insulating film having a level upper surface that completely fills concavo-convex regions deposited by a single operation is achievable. See page 5 of the Final Office Action dated June 16, 2008. Lastly, the Examiner states that no criticality has been established regarding the claimed single process versus more than one, and that, in general, the transposition of process steps or the splitting of one step into two or vice versa, where the processes are substantially identical or equivalent in terms of function, manner and result, was held to be not patentably distinguish the processes. See pages 5-6 of the Final Office Action dated June 16, 2008.

Applicant respectfully asserts, however, that finding the claimed invention obvious in view of JP '908, Speakman, Nagano, JP '698, and JP '499 is **clear error** because modification of JP '908 with the other cited prior art references would change the principle of operation of JP '908. That is, "[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810; 123 USPQ 349 (CCPA 1959). Here, JP '908 teaches a multiple step method of forming an inter-layer film where a first portion of the resin 3 is deposited adjacent conducting patterns 2 (see Fig. 1(b), and then a second portion of the resin 3 is deposited over the first portion and the conductive patterns 2 (see Figure 1(c)). By modifying this two-step process to be a single step using an ink-jetting method, the principle of operation of JP '908 is completely changed, which is impermissible. Because this is impermissible, finding the claimed invention obvious is **clear error**.

Moreover, because the Examiner has improperly changed the principle of operation of JP '908, the Examiner's allegation that "the processes of the present

invention and the relevant prior art are substantially identical or equivalent in terms of function, manner and result" is also without merit and **clear error**. That is, the only motivation to modify JP '908 in the manner alleged by the Examiner comes from hindsight gleaned from the teachings of the claimed invention. More specifically, "[a]ny judgement of obviousness is in a sense necessarily a reconstruction based on hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made and does not include knowledge gleaned only from applicant's disclosure, such a reconstruction is proper." *In re McLaughlin*, 443 F.2d 1392, 1395; 170 USQP 209, 212 (CCPA 1971).

Here, the Examiner has taken the teachings of JP '908, which discloses an uneven inter-layer film and a different method of depositing the inter-layer film, and alleged that it would be obvious to modify these teachings with the teachings of Speakman, Nagano, JP '698, and JP '499. The ONLY motivation to do so, however, comes from the teachings of the claimed invention. Such a reconstruction, therefore, is improper and **clear error**. Accordingly, the claimed invention is patentable over the prior art.

Respectfully submitted,

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